Little cost of injury to growth and development of damselflies

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notes on what I said are in boxes like this throughout

Appendage Injury & Loss

injury/loss is common and detrimental

Research Question

How does injury affect growth and development?

growth requires resources

healing and regeneration require resources

= tradeoff in resource allocation

Injury, Growth, and Development

Slowed Growth

crabs, lobsters, starfish, tadpoles, damselfly larvae, lizards, stick insects

Delayed Metamorphosis

toads, damselflies

Altered Molts

spiders, lobsters

negative effects are widespread in literature

Study System

Damselflies: *Ischnura posita*

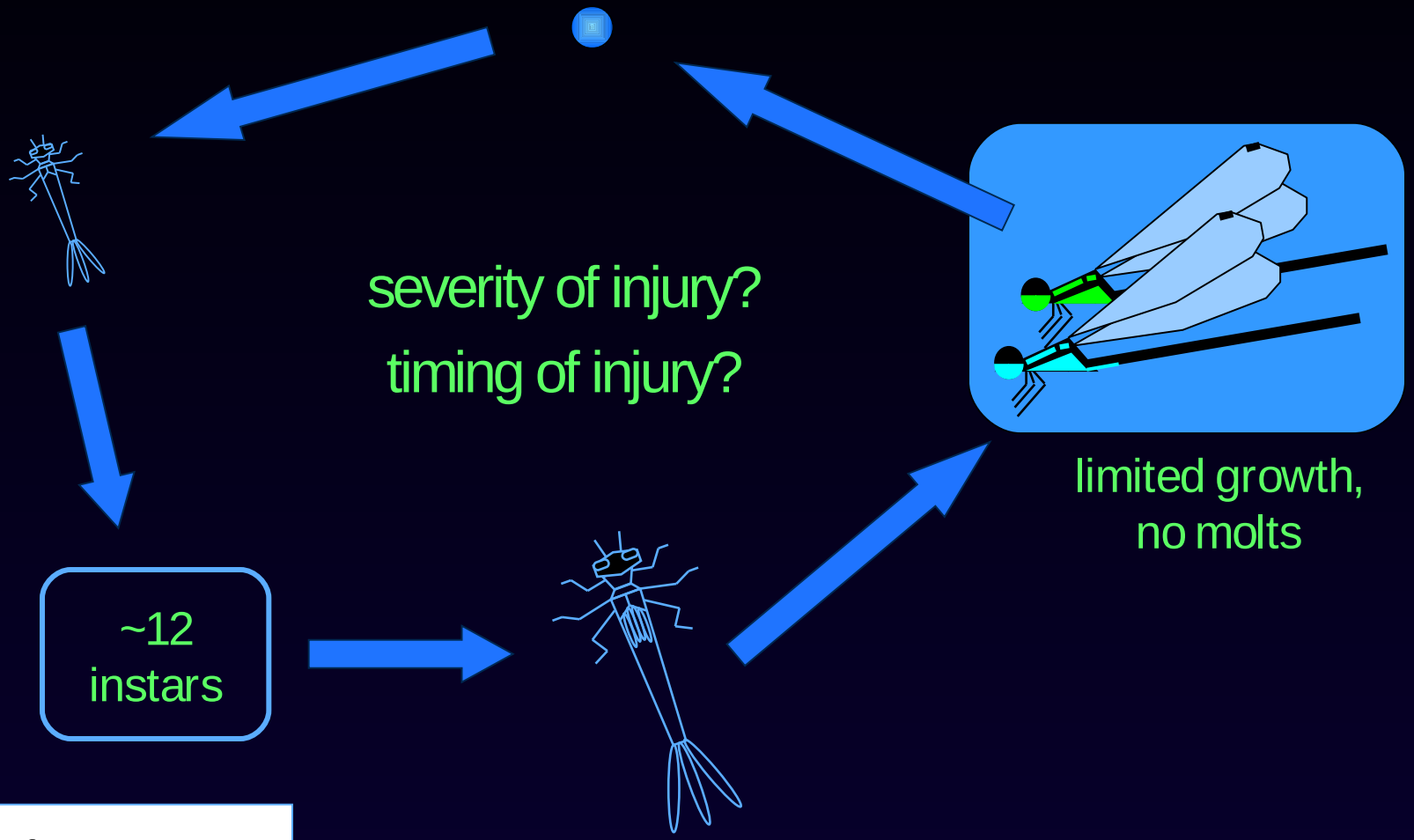
population non-lethal injury rate of 30-40%

lamellae used for respiration, swimming, communication

injuries have negative effects in other damselfly species

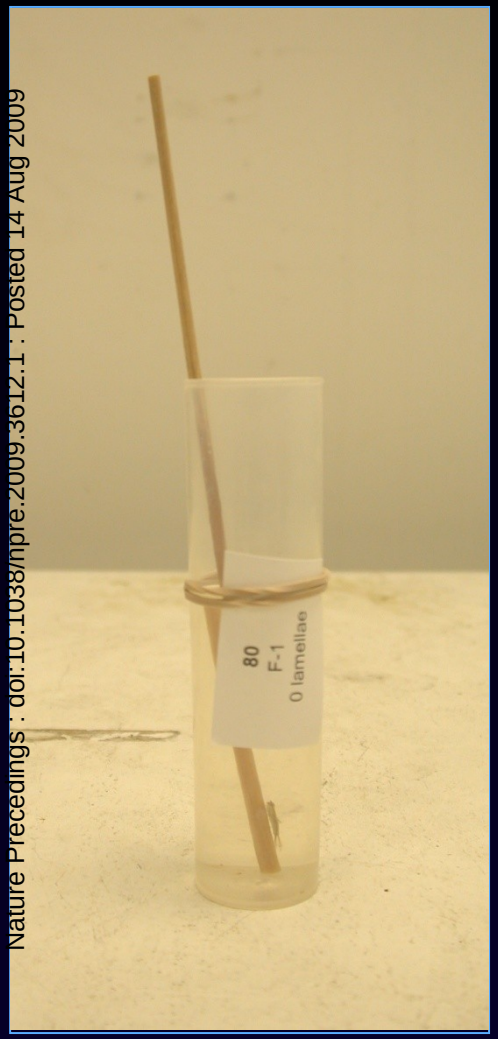
injuries can regenerate over time

I. posita Life Cycle



the specific questions
for this study

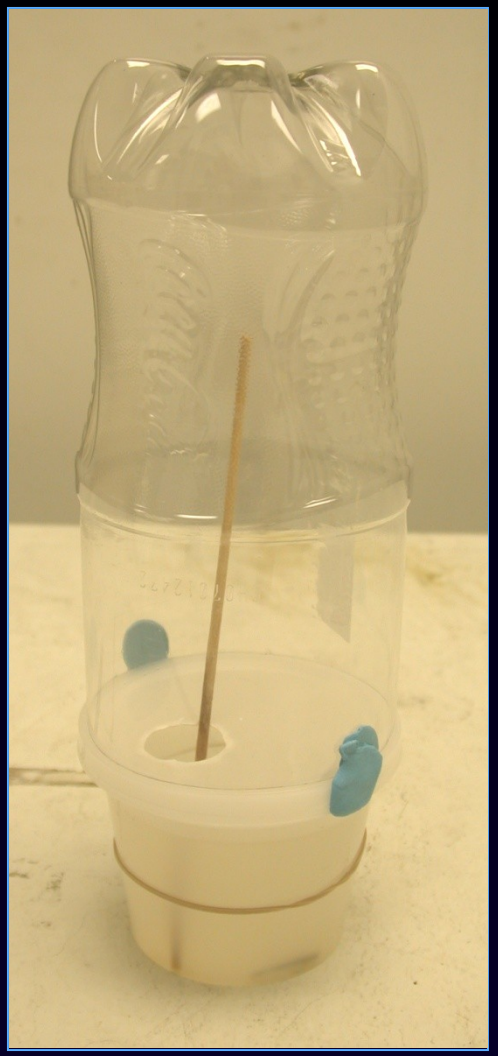
Methods



- collected small damselfly larvae in early spring

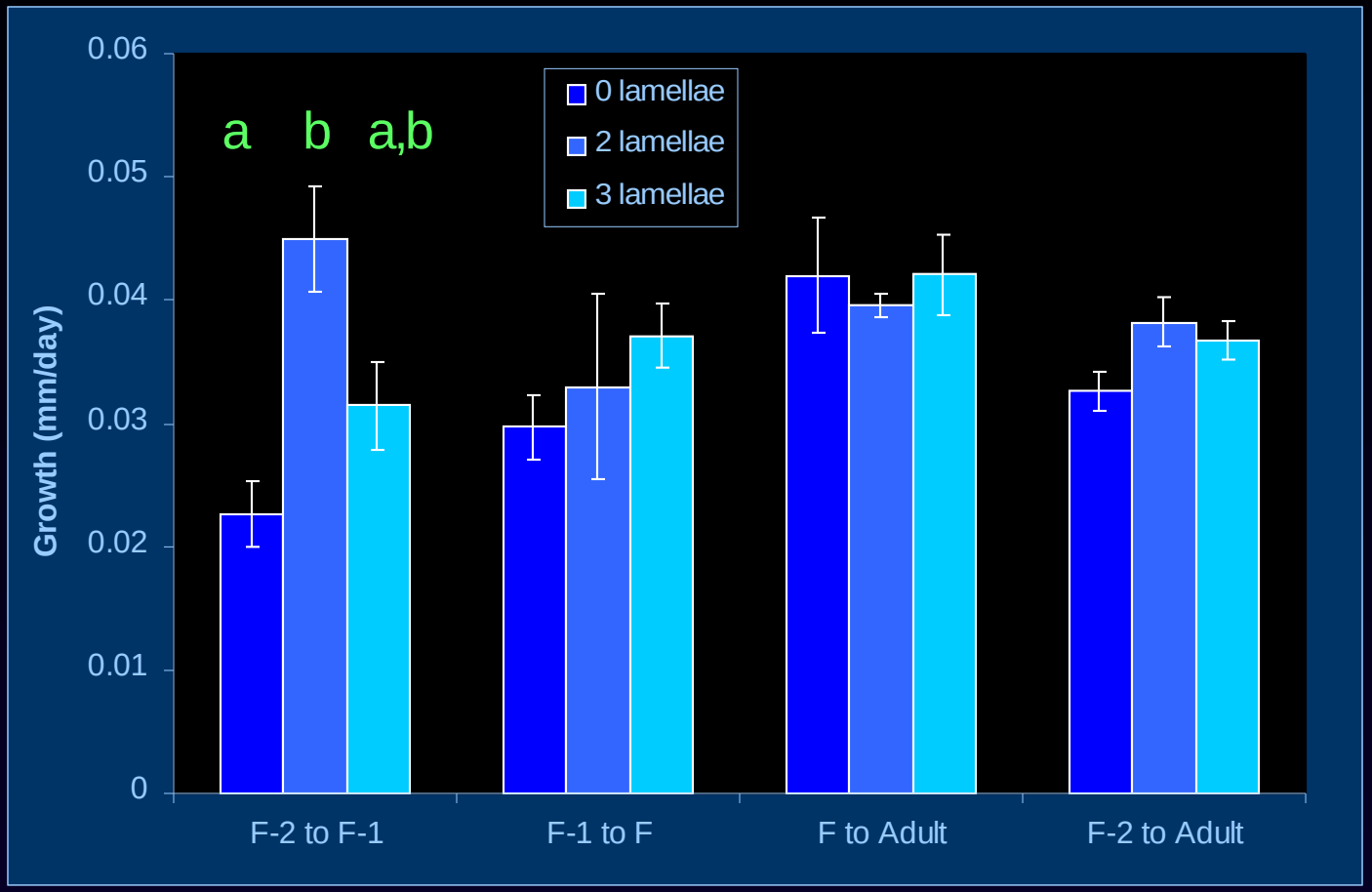
- held individually in "summer" conditions, checked daily

- injury severity (0, 2, 3)
x
timing (F-2, F-1, F)



F = final instar
F-1 = 1 instar before final
F-2 = 2 instars before final

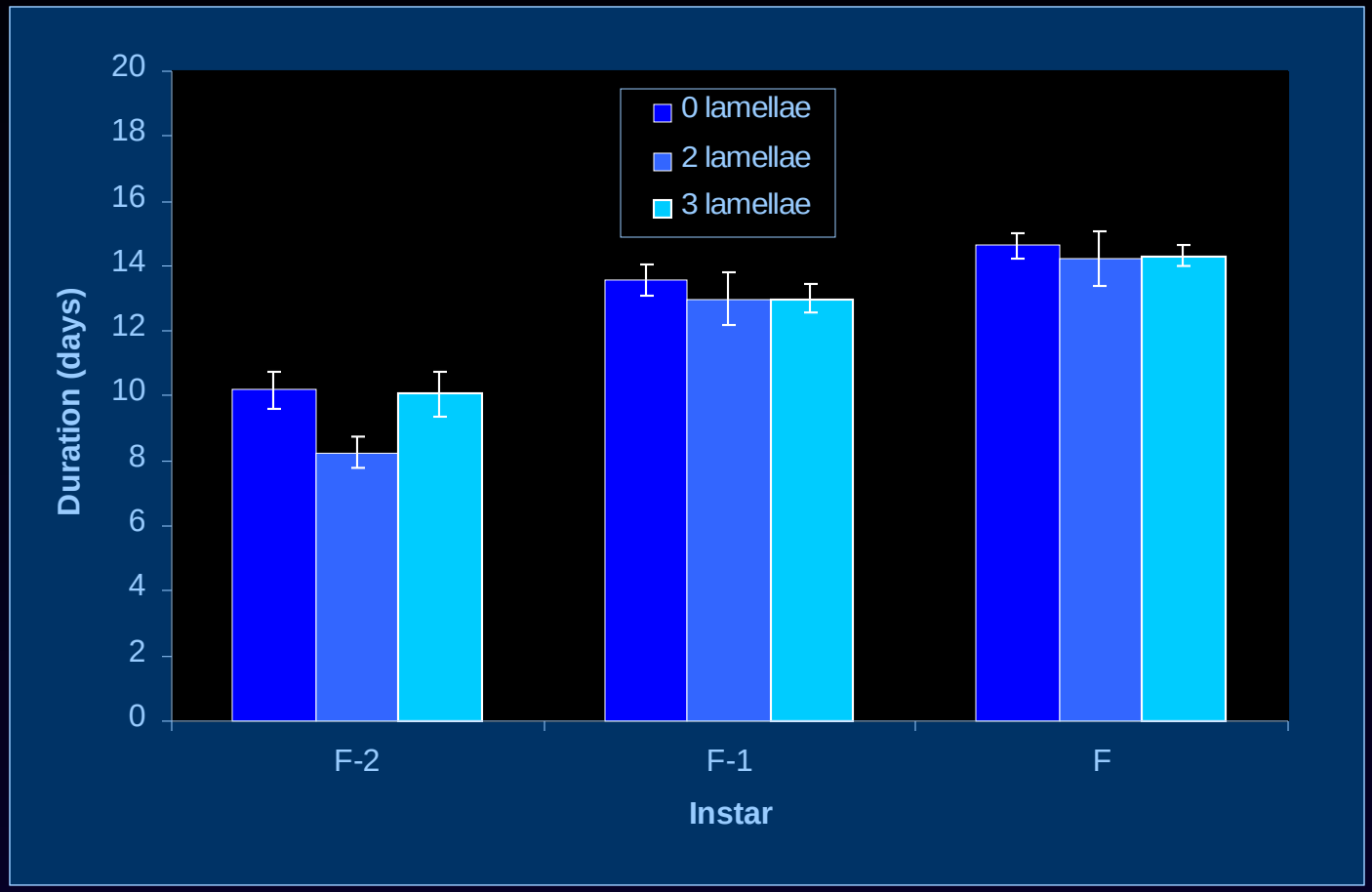
Results: Injury in F-2



significant effect from F-2 to F-1 ($p = 0.018$)

others: $p = 0.093, 0.523, 0.300$

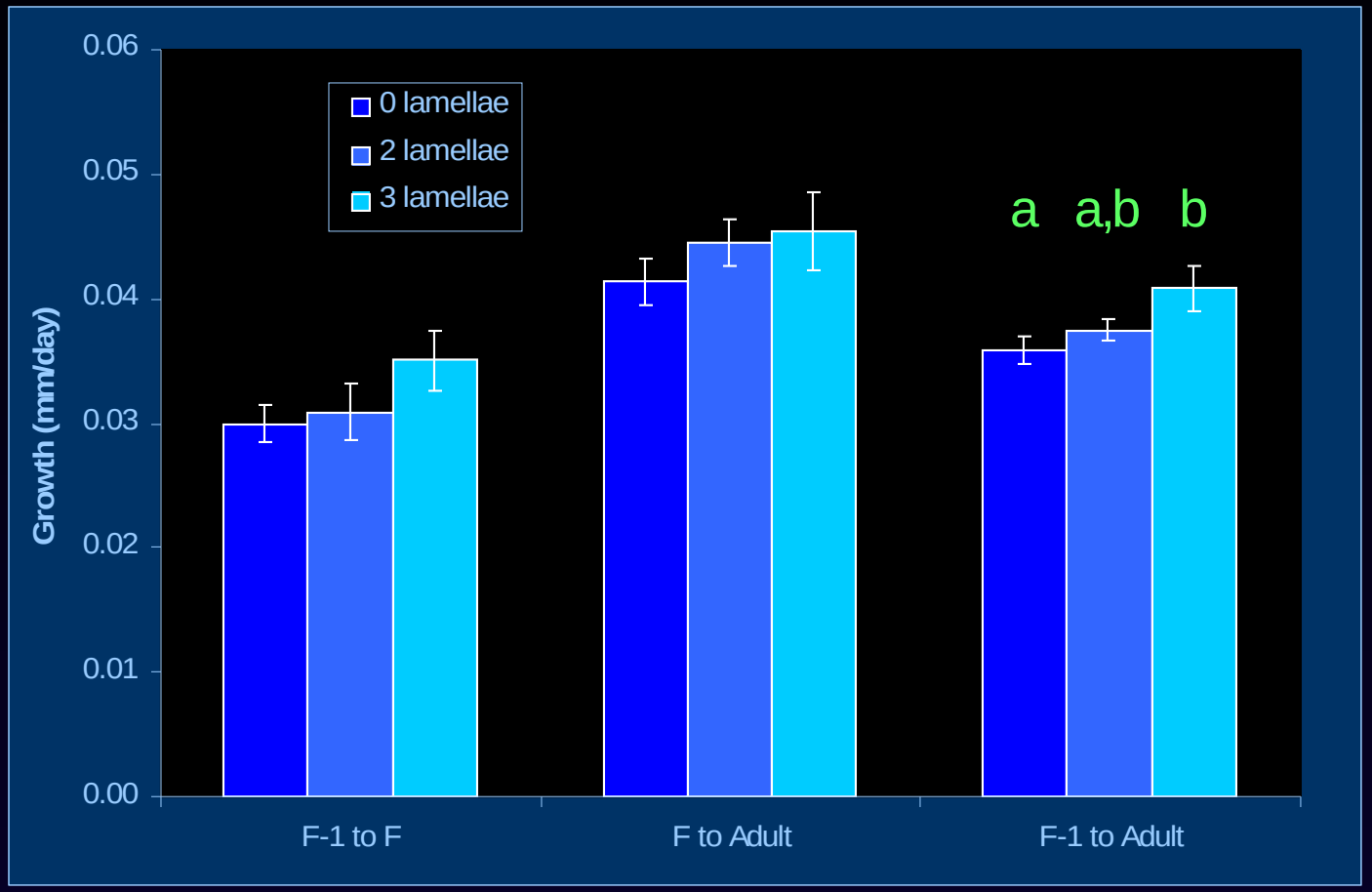
Results: Injury in F-2



no significant effects ($p = 0.292, 0.682, 0.812$)

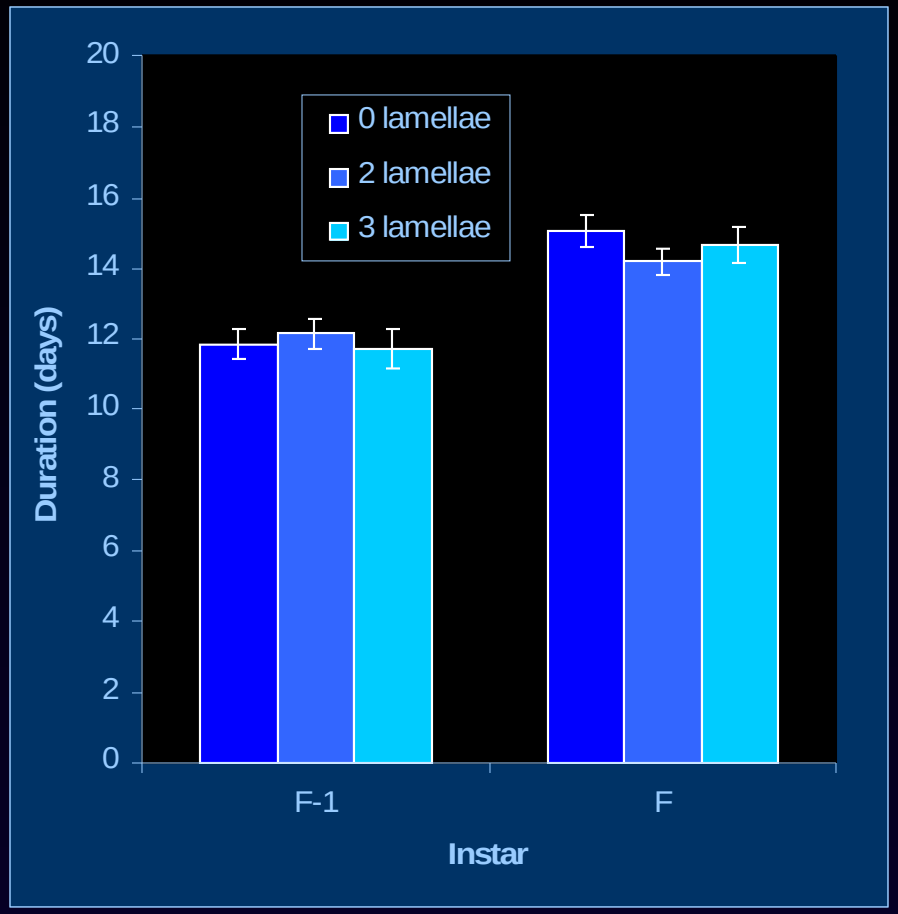
total duration: $p = 0.427$

Results: Injury in F-1



significant total effect ($p = 0.243, 0.219, 0.044$)

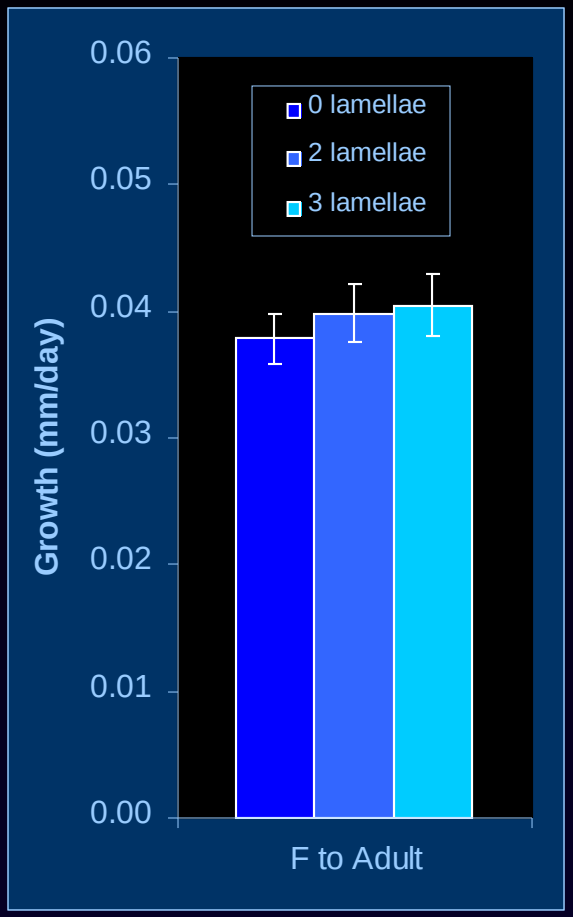
Results: Injury in F-1

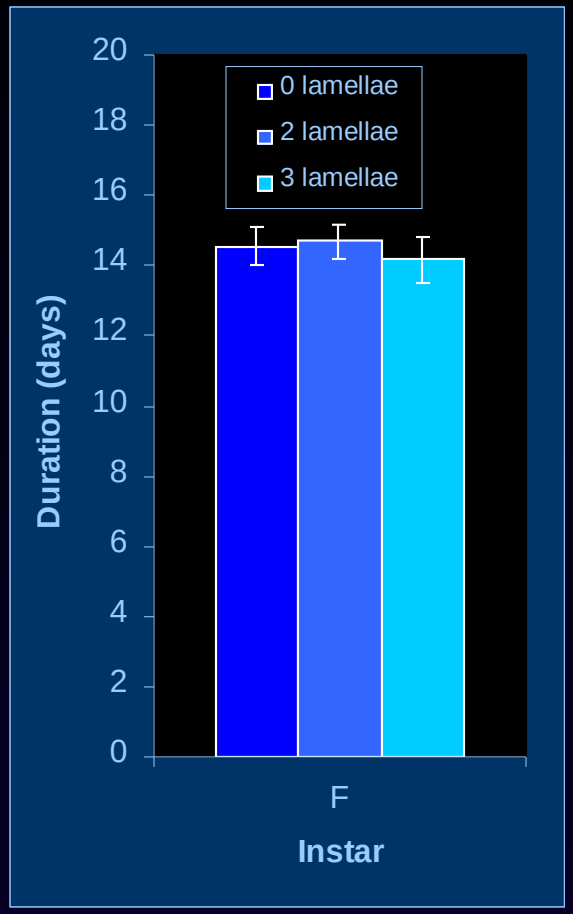


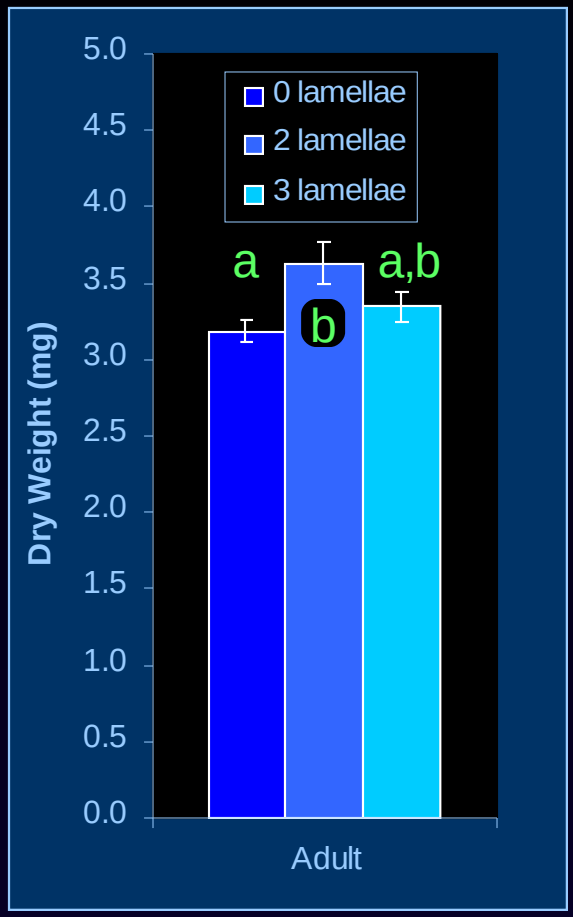
no significant effects (p = 0.807, 0.431)

total duration: p = 0.738

Results: Injury in F







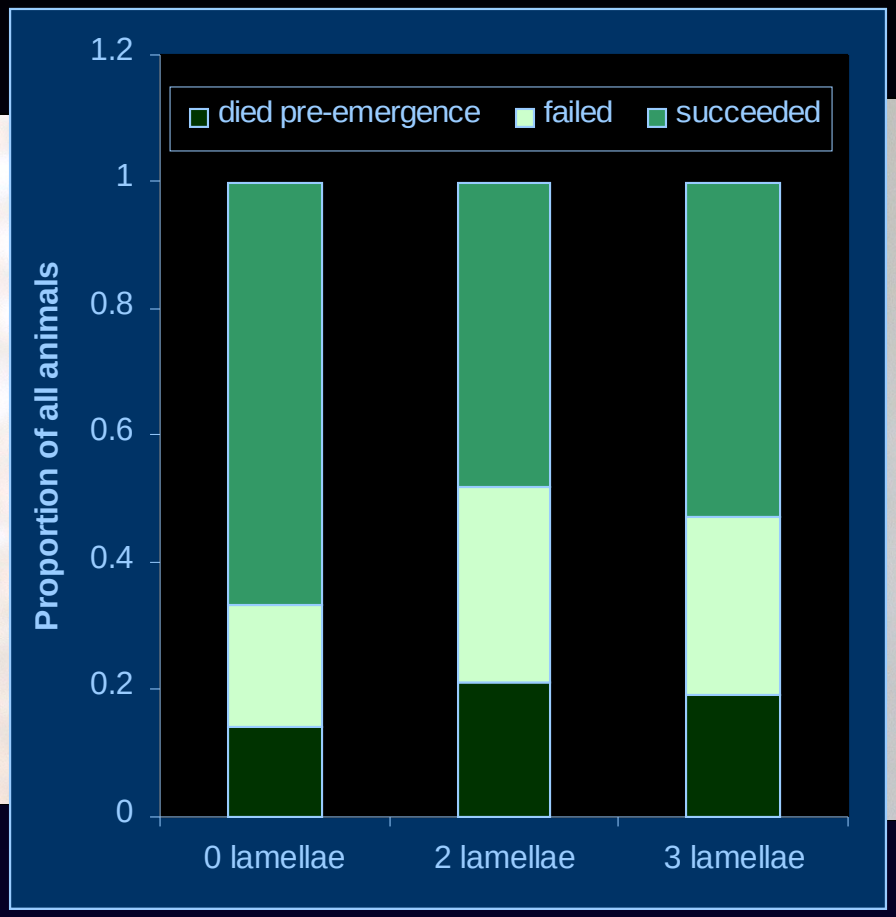
weight/condition NS for other treatments

no significant effects (p = 0.915, 0.810)

weight (p = 0.011)

condition (p = 0.003)

Results: Overall



succeed = emerge successfully

die = die as larva or fail emergence

no significant effects ($p = 0.376$)

succeed vs. die: $p = 0.121$

Results Summary

molts
no effects

growth
severe injuries more detrimental
than minor injuries

survival
no negative effects

Why no negative effects?

1) injury isn't that bad

2) compensation

3) no stress

our main hypotheses
as of ESA 2009

Injury isn't that bad?

Not that unusual

several lizard species

May be product of life history

Lestes sponsa ("fast") is negatively affected

Ischnura posita ("slow") is mostly not

L. sponsa research:
R Stoks and colleagues

Compensation?

possibly behavioral

- flexibility in feeding

(McPeek et al. 2001)

possibly physiological

- flexibility in assimilation

assimilation also from McPeek et al. 2001; study on *I. verticalis*

No Stress?

Real life is stressful

predators

competitors

pathogens

hypoxia

Funding

Gertrude Flora Ribble Fund

U.K. Graduate School

Kentucky Opportunity Fellowship

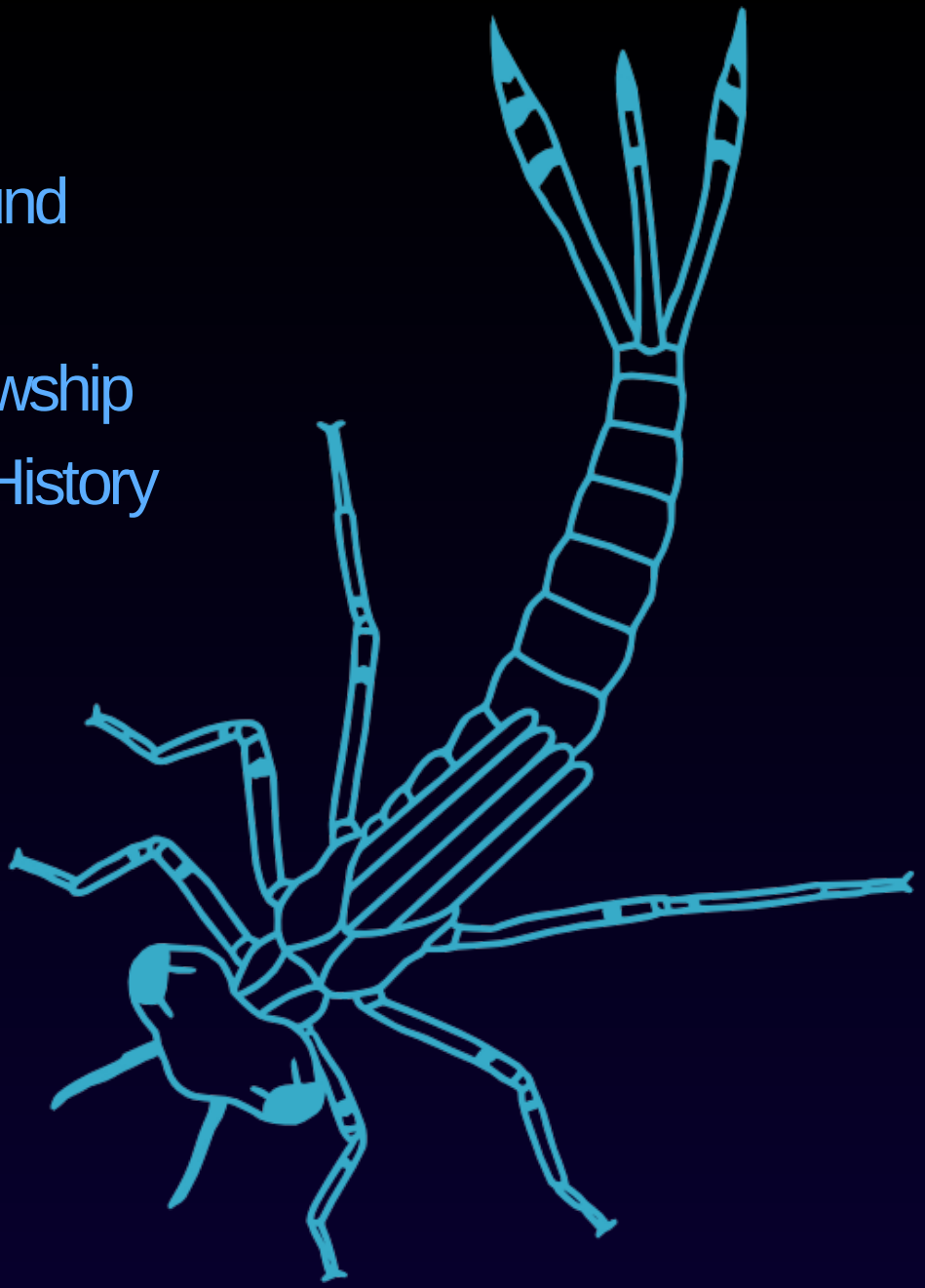
Kentucky Society of Natural History

People

Amanda Ensminger

Eric Robinson

Nicholas McLetchie



all photos and figures:
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